PREFERENCE AREAS AND INTRA-PRODUCT SPECIALIZATION

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I. Introduction

The theory of preferential trade liberalization has traditionally focused on trade in final products rather than components and parts. It has also seen such agreements in the main as trade agreements, although its insights have been applied successfully to the creation of Europe's Single Market, the so-called "Europe 1992" project. It has tended as well to focus on agreements involving countries at relatively similar stages of economic development. Inauguration of the North American Free Trade Agreement (NAFTA), on the other hand, has drawn attention to trade in components, to regional investment liberalization, and to preferential agreements linking developed and developing countries.[1]

It is well-known that preferential trade agreements involving final products may raise or lower welfare, depending upon whether the trade-creating elements dominate or not. The object of this paper is to examine the effects of preference arrangements covering trade in goods as well as components and allowing for the liberalization of foreign direct investment. The next section, considers the welfare effects of preference arrangements which alter only the conditions governing components trade. Liberalization of components trade allows the international division of labor to be extended beyond the realm of products. It is shown that component specialization in accordance with the dictates of comparative advantage raises wages in both the importing and the exporting country. It also raises industry output and employment in both countries. This finding

is at odds with the predictions of critics of NAFTA.

As in the case of trade liberalization involving final products, national welfare may rise or fall when a preferential trade arrangement removes tariffs on components while leaving them in place on final products. Trade liberalization covering both components and the final products in which they are used improves the likelihood of welfare enhancement.

The role of investment liberalization is also examined. Section III considers the case of foreign direct investment flows from a developed partner into a developing country, with the investment intended to create capacity for the production of labor-intensive components. The combination of foreign investment inflows and component specialization is shown to create more balanced growth in a developing country than results from either taken on its own. It is shown that while the capital accumulation facilitated by FDI flows may have familiar welfare-reducing effects in the recipient country, the combination of capital inflows into the developing country's labor-intensive export industry and adoption of component specialization in that industry is strongly welfare-enhancing in its tendencies. As in other contexts, however, non-discriminatory trade and investment liberalization dominates the preferential approach.

II. Varieties of Preference Arrangements

The theory of customs unions and preference areas has traditionally focused on trade in final products in working out the tension between trade creation and trade diversion. In North America, on the other hand, early forms of preferential trade liberalization stressed trade in parts and components. Component trade had a preeminent place, for example, in the original US-

Canada auto pact and in the maquiladora program between the United States and Mexico.[2]

The effects of component trade on output, employment, factor prices, and welfare have been examined in several recent studies.[3] Not surprisingly, extension of the international division of labor into the realm of components strengthens firms' competitive positions in final goods markets. This section builds on these findings by examining the consequences for two countries - one developed, the other developing - of component trade in the context of preferential trade liberalization.

In the initial situation, both countries have MFN tariff structures in place, with tariffs on imports of components as well as final goods. We consider first the case of preferential liberalization of components trade. In particular, assume that countries A and B both produce final goods X and Y and that the MFN tariff structure governing trade in final goods remains unchanged. Suppose further that the two countries are small with respect to the outside world. In view of the presence of tariffs, factor-price equalization is assumed not to hold.

Suppose that production of commodity X, which is the labor-intensive commodity and thus developed country A's import good, is made up of two components, x_1 and x_2, which may be produced either at home or abroad. Assume that the second component is the relatively labor-intensive component, so that its costs of production will tend to be lower in country B, the labor-abundant country.

The initial equilibrium conditions are represented in Figure 1, with labels for country B carrying an asterisk. In each panel, X_o and Y_o represent the unit-value isoquants for the two products, respectively, at pre-PTA prices. The tariff on component imports is assumed to be prohibitive, so that product X is initially produced at home in its entirety. The equilibrium wage-

rental ratio, w/r, is steeper in the advanced, capital-rich, labor-poor country. Consequently, equilibrium capital-labor ratios are higher in that country.

Implementation of the preferential trade agreement eliminates trade barriers on components and leads the two partners to specialize, with country A producing the relatively capital-intensive component x_1 and country B producing the labor-intensive component x_2. For simplicity, we assume that component specialization is complete and that each country pays for imports of a given component with exports of the other.

In its essentials, the resource savings introduced by component specialization are analogous to those produced by technological improvements.[4] This allows the reduction in resource costs due to offshore procurement of a component to be represented by an inward shift in the X-isoquant in each panel and by its relocation to the expansion path of the component in which the country specializes. Thus, at the initial wage-rental ratio, the new isoquant sits on the expansion path for x_1 in country A and on the expansion path for x_2 in country B.

The new unit-value conditions are represented by isoquants X_{o1} in each panel. The quantities of capital and labor associated with these isoquants are the quantities needed to produce enough of component x_1 to provide the required inputs for the manufacture of X and to serve as exports to country B in return for imports of component x_2. For present purposes, the factor cost of assembly is assumed to be included in the resource bundle represented by isoquants X_{o1}. Thus, the respective component isoquants fully reflect production costs in the X sector of each country.

With relative commodity prices given, the realignment of isoquants means that factor prices must change in order to restore equilibrium. The new equilibrium factor prices are

represented by wage-rental ratios (w/r)' in the respective panels; those ratios must be tangent to the original Y-isoquant and the new X_{o1}-isoquant. In the aftermath of component specialization in the X-sector, wages thus rise relative to capital rentals in both countries. This is an interesting result, insofar as it is at odds with the widely held notion that trade with a low-wage country must reduce wages in the high-wage country.

In both countries, capital-labor ratios rise everywhere, making both industry expansion paths steeper than before and ensuring that output will rise in the X-sector and fall in the Y-sector. The change in the capital-labor ratio in the X-sector of country B is subject to two counteracting forces. The resource savings due to offshore sourcing raise labor productivity more than that of capital and hence the K/L ratio falls at the initial factor-price ratio. Then, as the w/r ratio begins to rise in the process of adjustment to the new equilibrium wage-rental relationship, the K/L ratio rises. It moves past the original ratio given along expansion path Ox* and comes to rest along expansion path Ox_2*'.

Component specialization enables each country's X-industry to abandon the activity in which it has comparative disadvantage; as a result, costs fall, profits rise, and overall industry output increases. Pushing specialization based on comparative advantage into the realm of components yields results that are fully consistent with the well-known effects of specialization at the level of products.

Scale Economies

Introduction of component specialization and the rise in area-wide output of X may have consequences related to the exploitation of scale economies. If scale economies are present at the

level of component production, then additional advantages may accrue to the partners from intra-product specialization. With each country specializing in a component, production runs will be longer than before, even without an overall rise in area-wide output of X, but especially with such a rise. This will enable costs of component production to fall throughout the X-industry, thereby adding further to improvements in its competitiveness.

Terms of Trade

The two panels in Figure 2 examine the effects on commodity prices and national welfare of preferential liberalization of trade in components. The effect of offshore sourcing on the production possibility curves is analogous to the effect of technical progress. The curves expand outward along the axis representing the sector in which the change to offshore sourcing of a component takes place.[5]

With the world price and country A's tariff on imports of good X given, the domestic price remains unaltered at P_d. Production moves from Q_o to Q_1, reflecting the decline in Y-output discussed earlier. Consumption moves from C_o to C_1, which in the case drawn happens to lie on a lower indifference curve and thus represents welfare deterioration. In general, welfare may rise or fall in the aftermath of component specialization in the protected import industry. At the original world commodity price ratio, P_w, the welfare effect depends on the size of the distortion provided by the tariff.[6]

If a given domestic price is the result of a relatively large tariff and thus represents a significant distortion in the price signal, then the introduction of component specialization is more likely to decrease national welfare. The intuition draws in part on the theory of the effective rate

of protection. When component specialization reduces the cost of inputs, it serves to increase the effective rate of protection offered by a tariff on imports of the final product.[7] In other words, it enlarges the distortion.

In country B, on the other hand, component specialization takes place in the country's export good, while the MFN tariff is assumed to have been levied on the country's import good, Y. Implementation of component specialization shifts the production possibility curve out along the X-axis, moving the production equilibrium to Q_1* and the consumption equilibrium to C_1* on a higher indifference curve. The welfare effect is unambiguously positive. The difference in results between the two countries reflects the tendency for component specialization in country B to reverse the tariff-initiated movement of productive resources into the distorted industry, while it underscores and strengthens those tendencies in country A.

Thus, production of X, the commodity in which component specialization takes place, rises in both countries, while output of Y falls in both. As domestic output of X rises in country A, the demand for imports falls at the initial commodity price ratio, while the decline in Y-production reduces export supply of that product. Meanwhile, as X-output rises in country B, export supply rises at the initial commodity price ratio, while demand for imports of Y rises. If the two free-trade area partners are large relative to world markets, the effect of these changes will be to depress the world price of X in terms of Y.

This effect would be reflected by a flattening of P_w (not drawn) and hence of P_d and P_d*. This is a terms-of-trade improvement for country A, for whom X is the import commodity. It would clearly raise welfare. For country B, the change in P_w is a deterioration of the terms of trade and thus brings a decline in welfare. It is important to note that access to large world

markets is important for country B, whose terms of trade would deteriorate still further if the partner country were the only or the major customer for product X and supplier of Y.

III. Preference Areas and Investment Liberalization

Preference areas often liberalize more than just trade in goods. NAFTA, for example, is notable as much for liberalizing restrictions on foreign direct investment (FDI) and other types of capital movement as for freeing constraints on trade. Consequently, the welfare effects of this type of preference area depend on more than the standard adjustments in trade patterns. This would be true in general, but is probably especially significant for trade arrangements which introduce significant amounts of component specialization. Offshore component procurement by companies located in advanced countries is often preceded by creation abroad of productive capacity and hence by direct investment flows.

Suppose that in addition to the elimination of barriers on component trade among partners, the preferential trade arrangement also removes restrictions on the movement of foreign direct investment between the two countries. Suppose further that before the X-industry in country B can raise production levels of the x_2-component, it must expand capacity and that this is accomplished by means of foreign investment inflows. In this section, we examine the effect on country B of component specialization accompanied by capital accumulation financed by investment inflows.

The effect of capital accumulation in the present analytical framework depends on whether capital markets in the recipient country are integrated or segmented. We assume that capital markets are integrated, so that capital is freely mobile between sectors within country B. With

integrated capital markets, capital accumulation causes the production possibility curve to shift outward everywhere, but with a bias favoring the capital-intensive sector, Y. This effect is shown in Figure 3 by the move from production possibility curve TT to curve T'T'. Production moves from Q_o to Q_1, while consumption moves from C_o to C_1.

As noted in the preceding section, factor accumulation (or technical progress) biased in favor of the import sector may, under an import tariff raise or lower welfare, depending on the relative magnitudes of the distortion and the outward shift of the production frontier. Figure 3 displays the case of a deterioration in welfare. The welfare decline is shown by the movement from indifference curve I_o to indifference curve I_1.

The next step is to allow for the introduction of component specialization, which for country B means specialization in component x_2. The effect is to relocate the production possibility curve again, this time to curve T'T". Since the initial tariff on imports of good Y is unchanged, the tariff-inclusive commodity price ratio remains at P_d. The production equilibrium moves to point Q_2, while consumption moves to C_2 on indifference curve I_2. Welfare improves unequivocally in relation to the preceding level and may improve with respect to the initial situation. In the case depicted in Figure 3, welfare rises in relation to both alternatives.

The foregoing has assumed the absence of terms-of-trade effects. It is worth noting in passing, however, that the effect of capital accumulation would be to reduce the pressures, discussed earlier, for country B's terms of trade to deteriorate. This conclusion follows from the implied reduction of country B's trade triangle due to the expansion of the production frontier along the Y-axis which accompanies capital accumulation.

Liberalizing Trade in Final Products

This section allows for the preferential removal of tariffs on trade in final goods. We consider the implications first in terms of Figure 2, which rules out foreign direct investment and capital accumulation. When barriers fall on the movement of the two final products between the partners, in addition to those on the flow of components, then the price lines marked P_{pta} in the two panels of Figure 2 become relevant. They represent the intra-PTA relative commodity price and should be flatter than P_d, the domestic tariff-inclusive price in country A, and steeper than P_d*, the tariff-inclusive domestic price in country B. Although each country experiences an improvement in its intra-area terms of trade relative to initial tariff-inclusive domestic prices, the price of each country's respective import nevertheless remains higher than the world price.

The price adjustment clearly represents a welfare improvement in country A, relative to component trade liberalization alone. Inasmuch as component liberalization in an industry distorted by a tariff on the final product was shown earlier to be capable of reducing welfare, the fact that inclusion of the final product in the liberalization package moves welfare in the opposite direction improves the likelihood that such a preference area will be welfare-enhancing. When the nominal tariff on the final product comes down, it reduces the effective rate of protection and thereby offsets the expansionary effect on the latter of the removal of the tariff on imported components.

In country B, on the other hand, inclusion of final products in the trade liberalization package may raise or lower welfare relative to liberalization of components trade only. The case displayed in Figure 2 shows a decline in welfare, as production moves to Q_2* and consumption to C_2.* The seeming lack of symmetry between developments in the two countries stems from the

fact that the commodity in whose production component specialization takes place is country A's import commodity, but country B's export commodity.

The preference arrangement depicted in Figure 3 focuses on country B alone and includes foreign direct investment inflows and thus capital accumulation. As discussed earlier, the combination of capital accumulation and component specialization lead consumption and production to points subscripted by the number 2. When preferential trade liberalization is extended to final products, which for country B means elimination of the tariff on imports of good Y from country A, then the intra-area commodity price ratio, P_{pta}, must be steeper in the figure than the tariff-inclusive domestic price, but flatter than the free-trade world price, P_w.

As before, the effect of this change in the liberalization package may be to raise or lower welfare relative to the case of capital accumulation and liberalization of component trade alone. The slope of price line, P_{pta}, will be closer to the world price as costs in country A's Y-sector lie closer to costs in the outside world. If, on the other hand, country A is a relatively high-cost producer of Y, then the PTA price line will be relatively flat, thereby increasing the likelihood that preferential trade liberalization involving final goods will be welfare-reducing for country B. As drawn in Figure 3, the intra-PTA price line is sufficiently steep to produce a rise in welfare. Production is at Q_3 and consumption at C_3 on indifference curve I_3.

MFN Liberalization

It is clear from inspection of Figures 2 and 3, that the complications associated with the welfare effects of the various features of trade liberalization disappear when liberalization is conducted on an MFN basis. Then, the world price line is always tangent to the relevant

production possibility curve and each outward shift of the curve raises national welfare for the small country. For large countries, each outward movement enlarges country B's trade triangle, while reducing country A's. Thus, country B offers more X on world markets and demands more Y, while country A demands less of X and supplies less of Y. In combination, these pressures tend to reduce the world price of X, thereby impairing B's terms of trade while improving A's. This terms of trade effect provides an additional boost to national welfare in A, but reduces the welfare effect in B.

It is worth noting the complementary effects of capital accumulation and component specialization on country B's growth. Capital accumulation alone stretches the production possibility curve along the Y-axis, while component specialization in the X-sector alone stretches the curve along the X-axis. In combination, the two forces cause the curve to move more uniformly. Any movement outward of the production possibility curve lessens the forces tending to generate adverse terms of trade effects.

IV. Conclusion

Although the literature on preferential trade liberalization has focused on trade in final goods, regional arrangements like NAFTA apply to a broad range of components trade and they do as much to liberalize foreign investment as trade. Liberalization of component trade has effects that can differ significantly from those involving liberalization of final goods trade.

Extension of the international division of labor into the realm of components improves the efficiency of resource allocation and thus is welfare-enhancing. But its effects depend on the industry in which it takes place and in the trade policy environment in which it is implemented. In

the presence of distortions such as tariffs on imports of the final product, component liberalization in the import industry may raise as well as lower welfare.

When an advanced and a developing country implement a preferential trade arrangement which permits specialization at the component level in the import industry, wages rise in both countries, as do industry employment and output. These results are significantly at odds with the fears of certain NAFTA critics according to whom the agreement would drive down the wages of American workers and promote the export of jobs.

Component specialization is often accompanied by foreign direct investment flows from the developed to the developing partner. The combination of capital accumulation and component specialization in the export industry of the developing country tends to promote more balanced growth patterns than either alone. The two activities also generate synergies which tend to be welfare-enhancing.

Endnotes

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1. The U.S.-Canada auto pact and the arrangements between the United States and Mexico regarding maquiladora trade were important precursors.

2. The trade literature has much to say on trade in intermediate goods. For a sampling of that literature, see Batra and Casas (1973), Hazari, Sgro and Suh (1981), Ray (1975), Riedel (1976), and Sanyal and Jones (1982). See also Bertrand and Flatters (1971), Ethier (1982), and Schweinberger (1975).

3. See, for example, Arndt (1997, 1998), Deardorff (1998), and Jones and Kierzkowski (1998).

4. See Johnson (1971) and Rybczinski (1955).

5. For details, see Arndt (1997, 1998).

6. See Johnson (1967) for the effects of technical change and factor accumulation in a protected industry.

7. See Corden (1971) on the effective rate of protection and Ray (1975) for an application.

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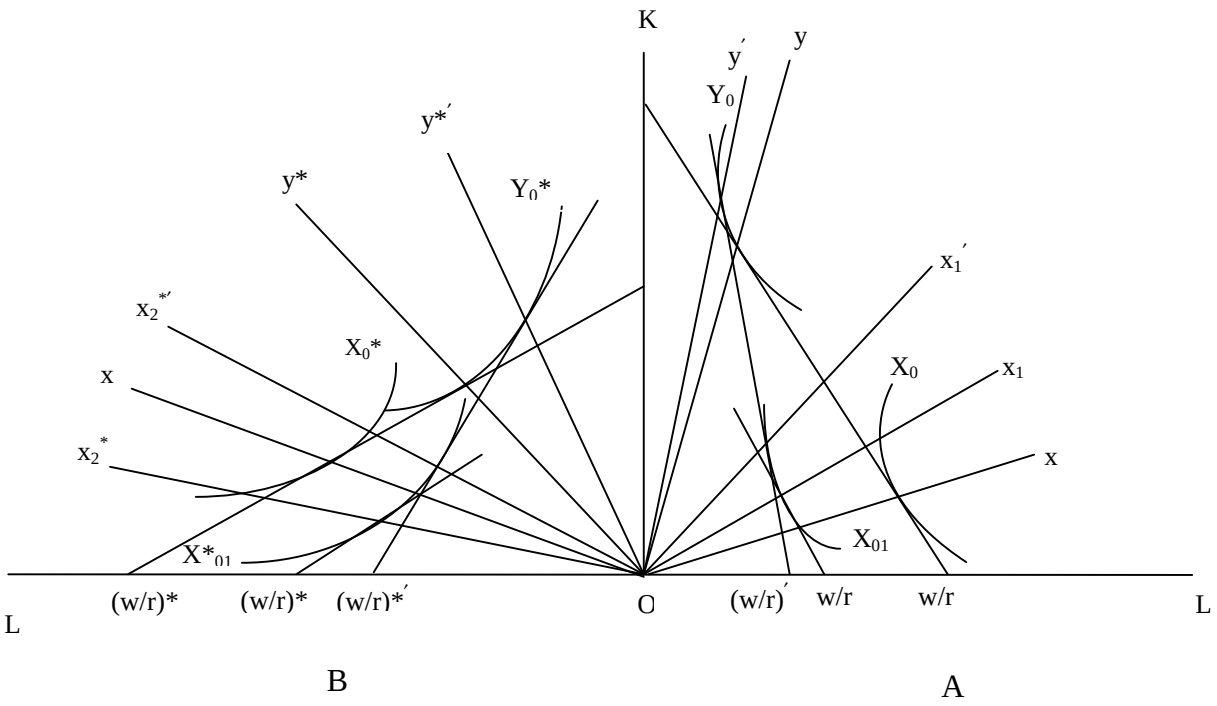

Fig. 1

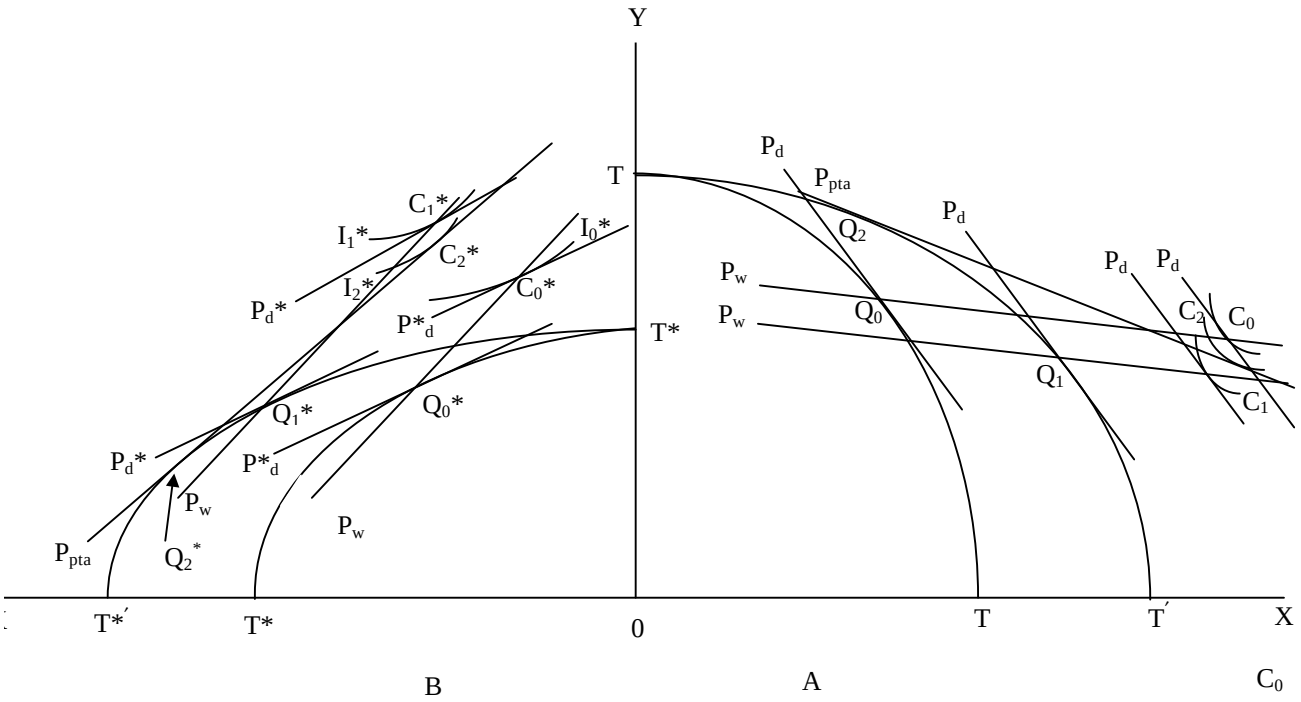
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Fig. 2

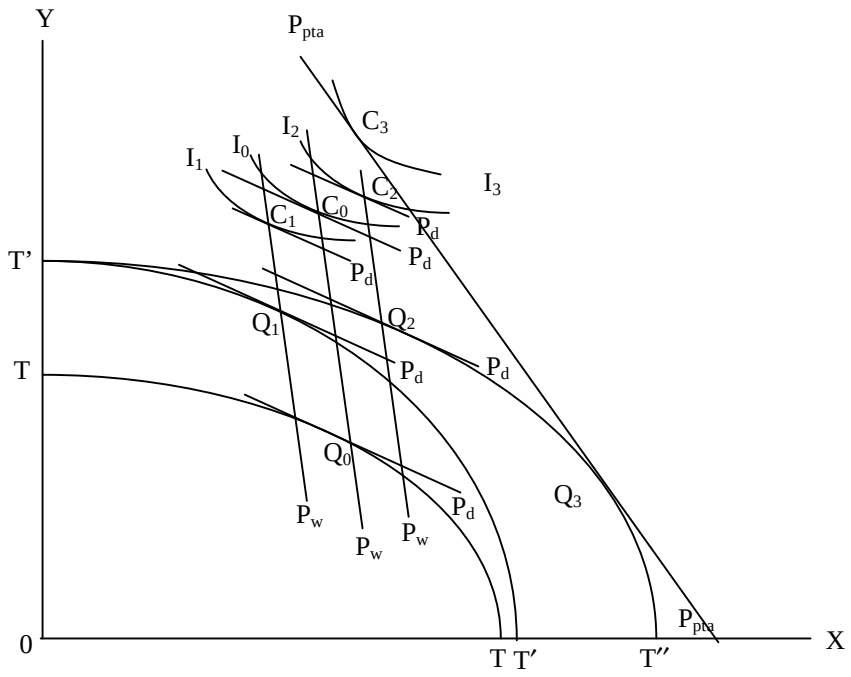
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Fig. 3